PSYCHOLOGICAL MEDICINE

Internet Addiction and Depression among College Students in Malaysia

Zahiruddin Othman[1)], Chung Wah Lee[2)]

ABSTRACT

Introduction: **Internet has revolutionized the information age. However, excessive internet use has led to health issues among users and the most commonly reported psychological problem is depression. Yet, there is dearth of research in this area among college students in Malaysia.**

Objective: **The aim of the present study was to examine the internet addiction (IA) and its association with depression and anxiety among college students.**

Methods: **Students age 18-24 from allied health colleges who were doing attachment and posting in Hospital Tengku Ampuan Rahimah, Klang were recruited into the study. IA was assessed using the internet addiction test (IAT), whilst depression and anxiety by using the hospital anxiety and depression scale (HADS)**

Results: **IA was significantly associated with depression ($p < 0.001$) and male gender ($p = 0.047$). In addition, IA was also associated with internet use characteristics such as using computer outside home ($p = 0.008$), using the internet for surfing ($p = 0.016$) and e-mailing ($p = 0.025$), and spending more time online during the weekends ($p = 0.003$). IA was not associated with anxiety ($p = 0.365$).**

Conclusions: **Internet addiction is associated with depression and male gender among Malaysian college students. Further study on psychological factors such as personality traits and coping styles is recommended in order to understand the underlying mechanism in IA and propose possible interventions.**

KEY WORDS

internet addiction, depression, young adults, college students, Malaysia

INTRODUCTION

The internet is a global system of interconnected computer networks that has revolutionized the information age, allowing human to gain access to unlimited amount of information as well as changing the way human communicates with each other[1,2)]. Affordable access to internet allows for rapid growth of users worldwide. It can have a positive impact, for example high internet usage (more than 6 hours/day) among medical students was associated with higher academic performance[3)]. Concurrently, many studies have shown that excessive internet use has led to negative impact on the health of users[4)].

The idea that problematic computer use meets criteria for an addiction was first proposed by Kimberly Young[5)]. Since then internet addiction (IA) has been extensively studied by other researchers using terms, such as pathological internet use[6)], problematic internet use[7)], excessive internet use and compulsive internet use and internet dependence[8)].

In DSM-V, internet gaming disorder, also commonly referred to as IA, has been included under Section 3- Emerging Measures and Models, which warrant further clinical research before it can be considered as a formal disorder. IA has nevertheless now been recognized as a public health issue, with behavior according to literatures, similar to that of gambling disorder, and has shown to cause dysfunction in the many aspect of the individual's life[4,9)].

A systematic review of scientific studies on IA indicated strong associations between IA, symptoms of ADHD, and depression. The strongest association was found between IA and depression. Otherwise anxiety, social phobia, obsessive-compulsive symptoms, and aggression did not appear to be significant factors of IA[10)].

A number of studies have been conducted in this field among Malaysian young adults[11-14)]. Depression was associated with male gender and pathological internet use among Malaysian undergraduates[11)]. In a cross-sectional online survey among young adults, compulsive internet use was associated with GHQ scores indicating presence of mental health problem[12)]. Otherwise, there is still scarcity of research focusing on the association between IA and depression or anxiety in Malaysia. The aim of the present study, therefore, was to examine the IA and its association with depression and anxiety among college students.

METHODS

Study setting and subjects

This cross-sectional study was approved by the USM Human Research Ethics Committee (HREC) and Malaysia Medical Research and Ethics Committee (MREC). It was conducted in November 2015 to January 2016 at Hospital Tengku Ampuan Rahimah (HTAR), a govern-

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1) School of Medical Sciences, Universiti Sains Malaysia
16150 Kubang Kerian, Malaysia
2) Department of Psychiatry, Hospital Tengku Ampuan Rahimah
41200 Kelang, Malaysia
Correspondence to: Zahiruddin Othman
(e-mail: zahirkb@usm.my)

Tables 1. Socio-demographic and internet use factors associated with internet addiction

Variable	n	No IA	IA	X^2 (df)	*P*-value
		n (%)	n (%)		
Gender					
Male	37	20 (54.1)	17 (45.9)	3.94 (1)	0.047
Female	230	162 (70.4)	68 (29.6)		
Race					
Malay	236	159 (67.4)	77 (32.6)	0.725 (3)	0.867
Chinese	10	7 (70.0)	3 (30.0)		
Indian	9	7 (77.8)	2 (22.2)		
Others	12	9 (75.0)	3 (25.0)		
Mode of online					
Smart phone					
Yes	262	179 (68.3)	83 (31.7)	0.157 (1)	0.692
No	5	3 (60.0)	2 (40.0)		
Home Computer					
Yes	91	60 (65.9)	31 (34.1)	0.317 (1)	0.574
No	176	122 (69.3)	54 (30.7)		
Computer Outside					
Yes	12	4 (33.3)	8 (66.7)	7.025 (1)	0.008
No	255	178 (69.8)	77 (30.2)		
Purpose Online					
Social Networking					
Yes	230	153 (66.5)	77 (33.5)	2.065	0.151
No	37	29 (78.4)	8 (21.6)	(1)	
Chatting					
Yes	207	141 (68.1)	66 (31.9)	0.01 (1)	0.975
No	60	41 (68.3)	19 (31.7)		
Surfing					
Yes	113	68 (60.2)	45 (39.8)	5.760 (1)	0.016
No	154	114 (74.0)	40 (26.0)		
Online Game					
Yes	67	41 (61.2)	26 (38.8)	2.003 (1)	0.157
No	200	141 (70.5)	59 (29.5)		
Email					
Yes	124	76 (61.3)	48 (38.7)	5.042 (1)	0.025
No	143	106 (74.1)	37 (25.9)		
Downloading					
Yes	167	112 (67.1)	55 (32.9)	0.248 (1)	0.618
No	100	70 (70.0)	30 (30.0)		
Online Shopping					
Yes	97	68 (70.1)	29 (29.9)	0.264 (1)	0.608
No	170	114 (67.1)	56 (32.9)		
		Mean (SD)	**Mean Difference**	***t* (df)**	
Average Online Time (hr/day)					
Weekdays					
No IA		4.66 (4.161)	1.08 (2.22, 0.06)	1.858* (265)	0.064*
IA		5.74 (4.904)			
Weekends					
No IA		9.73 (5.886)	2.37 (-3.93,-0.82)	3.014* (265)	0.003*
IA		12.11 (6.232)			

ment hospital situated in Klang where students from nearby allied health colleges came to do their attachments and postings as part of their training requirement of their respective courses.

The name list of Malaysian students aged 18-24 was obtained from the training unit in the administrative office of HTAR. All of the subjects were engaged after obtaining verbal consent from their clinical supervisor, in small groups of five to ten students at a time, due to their postings being in small groups in various different departments. Information related to the study and questionnaires were briefed to them and sufficient time was given allowing them to ask questions pertaining to the study. Those with previous history of mental illness or on psychiatric medications were excluded. A written consent form which had been distributed to each subject was signed and returned, before the questionnaires were allocated to them. All the questionnaire sets were tagged with a serial number for easy reference during data entry. The completed questionnaires were detached and separated from the consent form given so that they remained anonymous.

Table 2. Associations between internet addiction (IA) and anxiety or depression

		No IA	*IA*		
	n	***n (%)***	***n (%)***	***X2(df)***	***P-value***
Anxiety					
No	18	14 (77.8)	4 (22.2)	0.822 (1)	0.365
Yes	249	168 (67.5)	81 (32.5)		
Depression					
No	81	68 (84.0)	13 (16.0)	13.352 (1)	< 0.001
Yes	186	114 (61.3)	72 (38.7)		

Measurements

a. Socio-demographic and internet use information

Information on socio-demography and internet use of respondents was collected using a self-made questionnaire. These include duration of internet use in hours during the weekdays and weekends, vehicle for internet use, such as smartphone, home computer or computer outside home, and purpose of internet use, whether it is used for social networking, chatting, surfing, games, e-mailing, downloading, or shopping.

b. The internet addiction test (IAT)

The original IAT was created by Kimberly Young and by far the most widely translated and used tools for the assessment of IA globally. It comprises a total of 20 items rated on a 5-point Likert scale which takes about 5 minutes to complete. 8 items were adapted from the DSM-IV pathological gambling criteria and the remaining 12 items assessed the areas of life affected by the excessive internet use. It has good internal consistency and concurrent validity and is a reliable instrument to assess the addictive use of the internet[15].

Scores of 0-19, 20-49, 50-79, and 80-100 indicate limited use, mild/average user, moderate/regular user/occasional or frequent problems secondary to internet use, and severe/significant problematic use of internet. The validated Malay version of IAT was available with good internal consistency (Cronbach's $\alpha = 0.91$), parallel reliability (intraclass coefficient = 0.88, $p < 0.001$) and concurrent validity with the Compulsive Internet Use Scale (Pearson's correlation = 0.84, $p < 0.001$)[16].

c. The hospital anxiety and depression scale (HADS)

The HADS was designed to identify the caseness, which is possible and probable diagnosis of depression and anxiety among patients in non-psychiatric hospital clinics. The somatic symptoms of anxiety and depression were omitted to suit the hospital population so that the somatic symptoms originating from the patient's medical condition would not give a false positive on either the anxiety or depression component of the scales, making the scales suitable for hospital use[17]. A systemic review concluded that not only HADS is a questionnaire that performs well in screening for the dimensions of anxiety and depression component separately for caseness in a non-psychiatric hospital clinic setting, it also has the same properties when applied to the general population, in the general practice setting as well as among the psychiatric patients[18].

The scale has a total of 14 items, with 7 items in HADS-A and the other 7 items in HADS-D, all intermingled to form a complete questionnaire. It is rated from 0-3 in each item, thus scoring from a range of 0 to 21 for each component, that is the anxiety component and the depression component. It was found that a cut-off point of 8/21 for both the anxiety or depression component provides the most optimum sensitivity and specificity when using this tool. The anxiety component of HADS has a specificity of 0.78 and a sensitivity of 0.9 while the depression component has a specificity of 0.79 and a sensitivity of 0.83. A validated Malay version is available. The optimum cut-off point for both HADS-A and HADS-D is 8/9 with anxiety subscale sensitivity 90.0% and specificity 86.2% and depression subscale sensitivity 93.2% and specificity 90.8%[19].

Statistical analyses

The data were entered into the Statistical Package for Social Sciences (SPSS) version 22. The preliminary information on socio-demography, duration spent online and activities involved regularly online, of the study population were explored and analyzed using descriptive analysis. The associations between anxiety and depression component of the HADS and IA were analyzed using the chi square test. *P*-value of less than 0.05 was taken as significant at 95% confidence interval for all variables.

RESULT

A total of 267 college students who fulfilled the inclusion and exclusion criteria, and answered all the questions were included into the study. They comprised of the age group 18 to 24 years old with the mean age 20.9 with a standard deviation of 1.4. The majority were Malay (88.4%) and female (86.1%). During the weekdays 123 (46.1%), 84 (31.5%), 31 (11.6%), 14 (5.2%) and 15 (5.6%) of subjects spent time online for less than 3 hours, 3 to < 7 hours, 7 to < 9 hours, 9 to < 12 hours, and 12 hours or more, respectively. While during the weekend 13 (4.9%), 73 (27.3), 42 (15.7), 81 (30.3) and 58 (21.7) of subjects spent time online for less than 3 hours, 3 to < 7 hours, 7 to < 9 hours, 9 to < 12 hours, and 12 hours or more, respectively. The data demonstrated increased use of internet during the weekends in which majority use it for 9 hours or more.

As shown in table 1, the socio-demographic and internet use factors significantly associated with IA were male gender ($p = 0.047$), students who uses computer outside their home ($p = 0.008$), students who uses the internet for surfing ($p = 0.016$) and e-mailing ($p = 0.025$), and more time online during the weekends ($p = 0.003$). Table 2 showed that depression ($p < 0.001$) was significantly associated with IA while anxiety ($p = 0.365$) was not.

DISCUSSION

In this study, depression was significantly associated with IA that is consistent with other studies from South Korea[20-22], China[23-28], Norway[29], UK[30] and US[31]. A local study also had a similar finding[11]. Anxiety was not associated with AI that is consistent with 3 cross-sectional studies[25,26,30]. Male gender was significantly associated with IA that is consistent with other studies[22,24,26,29,30].

The biological explanation regarding the associations between IA and depression is still inconclusive. Genetic polymorphisms similarity between AI and depressed patients may explain the association. In a study by Lee *et al*.[32], 91 male adolescents with excessive internet use (EIU) and 75 healthy comparison subjects were compared on their genetic polymorphisms of the serotonin transport gene. The EIU group had higher homozygous short allelic variant of the serotonin transporter gene (SS-5HTTLPR) frequencies suggesting that EIU subjects may have genetic polymorphisms similar to depressed patients.

Structural alterations in the prefrontal cortex may mediate the relationship between internet gaming disorder (IGD) and depressed mood. In a study by Choi *et al*.[33], lower gray matter (GM) density in the left dorsolateral prefrontal cortex (DLPFC) in the IGD group than in the internet gaming control group and non-gaming control group, and the GM density was associated with lifetime usage of internet gaming, depressed mood, craving, and impulsivity in the gaming users. Striatal volumetric analysis detected a significant reduction in the right nucleus

accumbens in the IGD group and its association with lifetime usage of gaming and depression. These findings suggest that alterations in the brain structures involved in the reward system are associated with IGD-related behavioral characteristics. Furthermore, the DLPFC, involved in cognitive control, was observed to serve as a mediator in the association between prolonged gaming and depressed mood.

Although the cross-sectional design is reliable in determining associations, it is unable to determine the causal relationship between AI and depression. It is possible that subjects with IA are at higher risk for comorbid depression. On the other hand, it is also possible that depression leads to IA or both shared similar underlying biological causes. Therefore, it is recommended that prospective cohort studies be performed within this scientific field to determine the causality.

CONCLUSION

Internet addiction is associated with depression and male gender among Malaysian college students. Further in depth study is recommended which may include psychological factors such as personality traits and coping styles in order to investigate the dependent users and also to take measures to rehabilitate them if necessary.

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